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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/807,394	04/12/2001	Henning Henningsen	GRP-0001	9224

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EXAMINER

LUK, EMMANUEL S

ART UNIT PAPER NUMBER

1722

DATE MAILED: 03/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/807,394

Applicant(s)

HENNINGSEN, HENNING

Examiner

Emmanuel S. Luk

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 and 20-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 20-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 5, 7, 8, 10, 11, 15-17 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Fudim in view of Berlin (5790297).

Fudim teaches the claimed apparatus and method having a rapid prototyping machine for manufacturing 3-D objects(19), the apparatus having at least one light source (18) for illumination of a cross section of the light-sensitive material (11) by at least on spatial light modulator of individually controllable light modulators (20), wherein the at least one light source is optically coupled to a plurality of light guides (13) arranged with respect to the spatial light modulator arrangement in such a manner that each light guide illuminates a sub-area of the cross section (Col. 4, lines 42-48). The spatial modulator arrangement comprises transmissive light valves, optical fibers (14) constitute the optical light guides (13), the individual light valves are arranged in rows in a transverse direction of a surface at a given mutual distance, the rows being mutually displaced in the transverse direction (Fig. 4), the exposure head (18) comprising a bar having relative movement by the drives (16, 21) over the illumination surface, the optical means for spreading the light beams over the illumination surface.

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Fudim fails to teach at least two spatial light modulators of individually controllable light modulators.

In regards to the concept of a single light source used to illuminate a plurality of sub-areas, Hagenau clearly shows a spatial light modulator (11) that operates to illuminate a plurality of sub-areas (Fig. 1) from a light source (12). The claimed invention of having several spatial light modulators that illuminate a plurality of sub-areas as compared to a single spatial light modulator that operates in the same manner, this is merely a duplication of part for multiplied effect. The use of a single spatial modulator with individual controllable modulators is able to affect an area while having multiple can affect multiple areas. However, the functions of the modulators are the same for both multiple and single.

Additionally, the concept of more than one light modulators located between the single light source and the display surface is known in the projective display arts and is relevant to the stereolithography arts due to the same use of the light source and light modulators, Berlin teaches a single light source (350) that uses an array of two light modulators (340) between the light source and the display surface.

It would have been obvious to one of ordinary skill in the art to modify Fudim with the use of a spatial light modulator as taught by Hagenau and two light modulators as taught by Berlin because it allows for an increase in coverage in areas.

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3. Claims 3, 4, 6, 9, 13, 14 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fudim, as applied to claims 1, 2, 5, 7, 8, 10, 11, 15-17, and 21, and further in view of Hull (4,929,402).

Fudim teaches the claimed apparatus as shown above and the use of an array of miniature individually controlled mirrors that can be employed to modulate irradiation of individual fibers (Col. 4, lines 53-57).

Hagenau teaches that a DMD, is a digital micromirror device, and that a DMD array of micromirrors (46) is constructed on a semiconductor memory chip (Col. 7, lines 42-51). That the projection optics are selected to magnify the reflected image from the DMD (Col. 8, lines 1-3). The use of DMD's are widely known in the art and in fact, Fudim does teach DMD's in light of the teachings of Hagenau.

Fudim fails to teach micro lens, a short arc gap lamp, control circuitry and electromechanical light valves.

Hull teaches a rapid prototyping apparatus having a light source (26) using a 350 watt mercury short arc lamp in a housing focused on the end of a 1 mm diameter UV transmitting fiber optic bundle (Col. 7, lines 44-49). The bundle having an electronically controlled shutter blade between the lamp and the end of the bundle, that can turn the light through the bundle on and off, the optical output is fitted into a lens tube that has a quartz lens to focus the UV to a spot (Col. 7, lines 50-55). Hull also teaches that a UV laser is a better light source than a short arc lamp (Col. 5, lines 16-21) due to the intensity of the light source and the response of the UV curable liquid. Additionally, a

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computer (28) is utilized to control the basic functions of the stereolithographic functions.

The shutter blade is "electronically controlled" to turning the light in the bundle on and off, therefore the shutter blade is controlled by the computer. The shutter blade in conjunction with the fibers constitutes an electromechanical light valve. The computer comprises of control circuitry for controlling the elements of the stereolithographic apparatus. The lens tube acts as the micro lens for focusing the light source upon the material.

It would have been obvious to one of ordinary skill in the art to modify Fudim with a short arc lamp, control circuitry and micro lens as taught by Hull because it improved curing capabilities of the rapid prototyping apparatus with better response and intensity.

4. Claims 12 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fudim as applied to claims 1, 2, 5, 7, 8, 10, 11, 15-17, 20, and 21, and further in view of Penn.

Fudim teaches the claimed apparatus as shown above.

Fudim fails to teach a modulator comprising of an LCD, PDLC, PLZT, FELCD or Kerr cell and multi-mode fibers.

Penn teaches a rapid prototyping apparatus having an imager comprising of an LCD or LED, lasers, digital micro-mirrors, and other image projectors. Fudim does teach something similar to LED displays for use in the apparatus.

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The multi-mode fibers are interpreted by the examiner as fibers being capable of transmitting the light at different frequencies and intensities. Fiber optics are capable of transmitting the light depending on the light source and therefore are capable of being multi-mode.

It would have been obvious to one of ordinary skill in the art to modify Fudim with LCD as taught by Penn for use in the apparatus since it is an equivalent device as shown by Penn.

5. Claims 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Fudim in view of Hagenau and Berlin.

Fudim teaches the claimed apparatus and method having a rapid prototyping machine for manufacturing 3-D objects(19), the apparatus having at least one light source (18) for illumination of a cross section of the light-sensitive material (11) by at least on spatial light modulator of individually controllable light modulators (20), wherein the at least one light source is optically coupled to a plurality of light guides (13) arranged with respect to the spatial light modulator arrangement in such a manner that each light guide illuminates a sub-area of the cross section (Col. 4, lines 42-48). The spatial modulator arrangement comprises transmissive light valves, optical fibers (14) constitute the optical light guides (13), the individual light valves are arranged in rows in a transverse direction of a surface at a given mutual distance, the rows being mutually displaced in the transverse direction (Fig. 4), the exposure head (18) comprising a bar

having relative movement by the drives (16, 21) over the illumination surface, the optical means for spreading the light beams over the illumination surface.

Fudim fails to teach at least two spatial light modulators of individually controllable light modulators and the light guides located is disposed between the light source and spatial light modulators.

In regards to the concept of a single light source used to illuminate a plurality of sub-areas, Hagenau clearly shows a spatial light modulator (11) that operates to illuminate a plurality of sub-areas (Fig. 1) from a light source (12). The claimed invention of having several spatial light modulators that illuminate a plurality of sub-areas as compared to a single spatial light modulator that operates in the same manner, this is merely a duplication of part for multiplied effect. The use of a single spatial modulator with individual controllable modulators is able to affect an area while having multiple can affect multiple areas. However, the functions of the modulators are the same for both multiple and single.

Additionally, the concept of more than one light modulators located between the single light source and the display surface is known in the projective display arts and is relevant to the stereolithography arts due to the same use of the light source and light modulators, Berlin teaches a single light source (350) that uses an array of two light modulators (340) between the light source and the display surface.

In regards to the light guides, Fudim does teach the use of optical light guides for aid in guiding the light from the light source to the plurality of sub-areas. It is of the same function as both are used to aid in guiding the light along a path.

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It would have been obvious to one of ordinary skill in the art to modify Fudim with the use of a spatial light modulator as taught by Hagenau and two light modulators as taught by Berlin because it allows for an increase in coverage in areas.

Response to Arguments

6. Applicant's arguments with respect to claims 1-18 and 20-22 have been considered but are moot in view of the new ground(s) of rejection.

The rejections have been corrected to adequately reflect prior art, Berlin, in the rejection. Additionally, the rejections have been clarified to address the applicant's arguments of the multiplicity of parts and also the arrangements of the light guides in claim 22.

Conclusion


7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel S. Luk whose telephone number is (571) 272-1134. The examiner can normally be reached on Monday-Thursday 8 to 5 and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ben Utech can be reached on (571) 272-1137. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EL



ROBERT DAVIS
PRIMARY EXAMINER
GROUP ~~1300~~ 1722
3/7/05